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phase), presented by G. J. Newbegin; Photographs of instruments for eclipse observations and enlarged photograph of the transit of *Venus*, 1882, presented by D. P. Todd: Portrait of the late Professor J. E. Keeler, presented by the Lick Observatory; Small equatorially mounted telescope, formerly belonging to the late Mr. B. T. Moore, presented by Miss Moore.

Mean Areas and Heliographic Latitudes of Sun-spots in the year 1899, deduced from Photographs taken at the Royal Observatory, Greenwich, at Dehra Dûn (India), and in Mauritius.

(*Communicated by the Astronomer Royal.*)

The results here given are in continuation of those printed in the *Monthly Notices*, vol. lx. p. 157, and are deduced from the measurements of solar photographs taken at the Royal Observatory, Greenwich; at Dehra Dûn, India; and at the Royal Alfred Observatory, Mauritius.

Table I. gives the mean daily areas of umbræ, whole spots, and faculæ for each synodic rotation of the Sun in 1899; and Table II. gives the same particulars for the entire year 1899 and the ten preceding years, for the sake of comparison. The areas are given in two forms: first, projected areas—that is to say, as seen and measured on the photographs, these being expressed in millionths of the Sun's apparent disc; and next, areas as corrected for foreshortening, the areas in this case being expressed in millionths of the Sun's visible hemisphere.

Table III. exhibits for each rotation in 1899 the mean daily area of whole spots, the mean heliographic latitude of the spotted area, and the mean distance from the equator of all spots; and Table IV. gives the same information for the year as a whole similar results from 1889 to 1898 being added, as in the case of Table II. Tables II. and IV. are thus in continuation of the similar tables for the years 1874 to 1888, on pp. 381 and 382 of vol. xlix. of the *Monthly Notices*.

The rotations in Table I. and Table III. are numbered in continuation of Carrington's series (*Observations of Solar Spots made at Redhill*, by R. C. Carrington, F.R.S.), No. 1 being the rotation commencing 1853 November 9. The assumed prime meridian is that which passed through the ascending node at mean noon on 1854 January 1, and the assumed period of the Sun's sidereal rotation is 25·38 days. The dates of the commencement of the rotations are given in Greenwich civil time, reckoning from mean midnight.

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TABLE I.

No. of Rotation.	Date of Commencement of each Rotation.	No. of Days on which Photographs were taken.	Mean of Daily Areas. Projected. Umbræ.	Mean of Daily Areas. Projected. Whole Spots.	Mean of Daily Areas. Projected. Faculæ.	Mean of Daily Areas. Corrected for Foreshortening. Umbræ.	Mean of Daily Areas. Corrected for Foreshortening. Whole Spots.	Mean of Daily Areas. Corrected for Foreshortening. Faculæ.
	d							
605	1898 Dec. 18·20	27	44	271	399	28	182	436
606	1899 Jan. 14·53	27	28	154	402	19	108	424
607	Feb. 10·87	27	7·0	38	218	7·0	36	248
608	Mar. 10·20	28	82	485	441	55	336	474
609	Apr. 6·50	27	30	159	344	22	116	411
610	May 3·76	27	9·6	61	211	7·1	44	259
611	May 30·97	27	29	173	410	22	137	487
612	June 27·17	27	73	448	439	49	301	483
613	July 24·37	27	5·0	21	345	2·7	15	365
614	Aug. 20·60	27	0	3·0	161	0	2·1	177
615	Sept. 16·86	28	9·7	54	160	5·6	30	185
616	Oct. 14·14	27	20	129	152	13	81	198
617	Nov. 10·44	28	13	67	233	8·5	48	279
618	Dec. 7·76	27	9·9	72	263	6·9	51	277

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TABLE II.

Year.	No. of Days on which Photographs were taken.	Mean of Daily Areas. Projected. Umbræ.	Projected. Whole Spots.	Projected. Faculæ.	Corrected for Foreshortening. Umbræ.	Corrected for Foreshortening. Whole Spots.	Corrected for Foreshortening. Faculæ.
1889	360	17·9	103	107	13·1	78·0	131
1890	361	21·3	133	273	15·5	99·4	304
1891	363	120	745	1322	86·2	569	1412
1892	362	255	1596	3230	186	1214	3270
1893	362	327	1983	2287	234	1464	2404
1894	364	317	1728	1666	231	1282	1877
1895	364	237	1330	2059	169	974	2278
1896	364	127	745	1243	90	543	1410
1897	364	122	695	977	83	514	1149
1898	363	93	532	767	64	375	891
1899	364	27	159	297	18	111	337

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TABLE III.

No. of Rotation.	Date of Commencement of each Rotation.	No. of Days on which Photographs were taken.	Spots North of the Equator. Mean of Daily Areas.	Spots North of the Equator. Mean Heliographic Latitude.	Spots South of the Equator. Mean of Daily Areas.	Spots South of the Equator. Mean Heliographic Latitude.	Mean Heliographic Latitude of Entire Spotted Area.	Mean Distance from Equator of all Spots.
605	1898 Dec. 18^{d}·20	27	4·6	8°·46	178	11°·68	−11°·17	11°·60
606	1899 Jan. 14·53	27	0·1	7·95	108	11·05	−11·04	11·05
607	Feb. 10·87	27	0·0	...	36	5·39	− 5·39	5·39
608	Mar. 10·20	28	5·5	10·76	331	10·63	− 9·67	10·03
609	Apr. 6·50	27	11	9·52	105	10·82	− 8·85	10·70
610	May 3·76	27	0·0	...	44	11·84	−11·84	11·84
611	May 30·97	27	97	5·95	41	12·90	+ 0·39	8·00
612	June 27·17	27	150	5·93	152	9·99	− 2·09	7·98
613	July 24·37	27	0·0	...	15	11·58	−11·58	11·58
614	Aug. 20·60	27	0·4	2·95	1·7	10·43	− 7·94	9·03
615	Sept. 16·86	28	15	4·18	15	12·20	− 4·14	8·25
616	Oct. 14·14	27	0·1	6·95	81	9·97	− 9·94	9·96
617	Nov. 10·44	28	4·1	3·96	44	7·54	− 6·55	7·23
618	Dec. 7·76	27	29	7·16	22	11·61	− 0·97	9·09

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TABLE IV.

Year.	No. of Days on which Photographs were taken.	Spots North of the Equator. Mean of Daily Areas.	Spots North of the Equator. Mean Heliographic Latitude.	Spots South of the Equator. Mean of Daily Areas.	Spots South of the Equator. Mean Heliographic Latitude.	Mean Heliographic Latitude of Entire Spotted Area.	Mean Distance from Equator of all Spots.
1889	360	5·0	7°·26	73·0	11°·90	−10°·68	11°·61
1890	361	53·1	22·20	46·3	21·75	+ 1·73	21·99
1891	363	401	20·49	169	19·91	+ 8·52	20·31
1892	362	607	15·09	607	21·69	− 3·29	18·39
1893	360	517	14·91	941	14·26	− 3·93	14·49
1894	364	543	12·31	739	15·56	− 3·75	14·18
1895	364	565	14·26	409	12·54	+ 3·01	13·54
1896	364	203	13·60	340	14·77	− 4·15	14·33
1897	364	196	8·32	318	7·73	− 1·62	7·96
1898	363	110	9·82	266	10·77	− 4·75	10·49
1899	364	23	6·18	88	10·43	− 6·95	9·54

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The principal features of the record for 1899 are :—

(1) The decline in area of umbræ, whole spots, and faculæ has gone on with great rapidity ; the decrease in mean daily spotted area amounting to 70 per cent. for 1899, as compared with 1898, and to 78 per cent. as compared with 1897.

(2) The decrease in the area of the umbræ has been in almost exactly the same proportion as for the whole spots—72 per cent. as compared with 1898, 80 per cent. as compared with 1897.

(3) The decrease in the area of the faculæ has been almost as great—62 per cent. as compared with 1898, 71 per cent. as compared with 1897.

(4) The northern hemisphere has been much the least active, giving only one-fifth of the total mean daily spotted area.

(5) The rate of decline in the two hemispheres has not been very different, but has been greatest in the northern; the decrease, as compared with 1898, is 79 per cent. for the northern hemisphere, and 67 for the southern.

(6) The two chief outbreaks of the year occurred in March and June respectively, but were both very far inferior to the great group of September 1898 ; indeed, neither of them would have been at all noticeable at the period of maximum. The first of these groups was first seen near the east limb on March 15, and disappeared at the west limb on March 27. It was seen only during the one rotation. The other group was first seen on the east limb on June 23, having formed on the further hemisphere. It consisted at first chiefly of one very large regular spot, and like the March group was seen only during one passage.

(7) The distribution of the spots in latitude in 1899 has been marked by a slight approach towards the equator, the mean distance being 9°·54 as compared with 10°·49 in 1898. This latitude is distinctly higher than that for the year 1887 in the last cycle, but is almost exactly the same as for 1877 in the preceding cycle.

(8) The number of days without spots has very greatly increased, having risen to 123, as against 48 for 1898. The number of days without faculæ has increased even in a larger ratio, being 105, as against 11 in 1898.

(9) As compared with 1887, the mean daily spotted area is much smaller, being 111 as against 179 ; so that the decline towards the minimum would, so far as this element is concerned, seem to be further advanced in 1899 than in 1887. The number of days without spots also supports the same conclusion. The mean distance of the spots from the equator rather points to 1899 being further from the minimum than was 1887. On the whole, if the general progress of the present cycle follows the course of the last, the next minimum should fall sometime in the latter half of 1901.

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Micrometric Measures of the Diameter of Neptune and distance and position-angle of the Satellite made with the 28-inch refractor at the Royal Observatory, Greenwich.

(*Communicated by the Astronomer Royal.*)

The following measures were made with the full aperture of the 28-inch refractor and a power of 670. No correction for irradiation has been applied to the measures of diameters.

The initials L., B., W. B. are those of Mr. Lewis, Mr. Bryant, and Mr. Bowyer respectively.

Micrometric Measures of the Diameter of Neptune.

Date.	Apparent Diameter. Equatorial.	Apparent Diameter. Polar.	No. of Measures.	Diameter reduced to mean distance, 30·05508. Equatorial.	Diameter reduced to mean distance, 30·05508. Polar.	Observer.
1896.	″	″		″	″	
Nov. 18	2·10	2·03	10, 10	2·02	1·96	L.
20	2·05	1·91	10, 10	1·98	1·83	,,
1897.						
Dec. 17	2·03	2·10	10, 10	1·95	2·02	,,
20	...	2·14	6	...	2·07	W. B.
22	2·34	...	10	2·25	...	B.
	2·38	2·27	10, 10	2·27	2·18	L.
24	2·20	2·64	8, 8	2·11	2·54	W. B.

Micrometric Measures of the Satellite of Neptune.

Date and Mean Time.					Sidereal Time.			No. of Measures.	Apparent Distance.	Distance reduced to mean distance of Neptune (30·05508).	Position-Angle.		Observer.
1896.	d	h	m	s	h	m	s		″	″	°	′	
Nov.	18	12	38	9	4	32	20	8	15·94	15·35	...		L.
		12	33	12	4	27	22	4	...	...	264	9	,,
	30	11	38	32	4	19	52	10	17·35	16·68	...		,,
		11	38	8	4	19	28	4	...	...	251	53	,,
Dec.	7	11	7	56	4	16	47	6	13·17	12·95	...		,,
		11	9	17	4	18	8	4	...	...	204	2	,,
	31	9	29	42	4	12	54	10	11·06	10·65	...		,,
		9	18	56	4	2	6	4	...	...	167	30	,,
1897													
Nov.	29	9	42	52	2	19	0	13	14·94	14·37	...		,,
		9	38	48	2	14	55	4	...	...	275	8	,,
Dec.	3	10	57	1	3	49	7	5	16·09	15·46	...		,,
		10	50	49	3	42	53	4	...	...	58	55	,,
	17	10	5	20	3	53	29	10	16·74	16·09	...		,,
		9	56	27	3	44	34	4	...	...	258	18	,,